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09/427,802	10/27/1999	BAHRAM GHAFFARZADEH KERMANI	KERMANI-14	3789

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EXAMINER

HIRL, JOSEPH P

ART UNIT	PAPER NUMBER
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2121

18

DATE MAILED: 02/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/427,802

Applicant(s)

KERMANI, BAHRAM  
GHAFFARZADEH

Examiner

Joseph P. Hirl

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

1. This Office Action is in response to an AMENDMENT entered November 19, 2003 for the patent application 09/427,802 filed on October 27, 1999.
2. Prior office actions related to 09/427,802 are fully incorporated into this Final Office Action by reference.
3. The claims and only the claims form the metes and bounds of the invention. "Office personnel are to give the claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. *In re Prater*, 415 F.2d, 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969)" (MPEP p 2100-8, c 2, I 45-48; p 2100-9, c 1, I 1-4). The Examiner has full latitude to interpret each claim in the broadest reasonable sense. Examiner will reference prior art using terminology familiar to one of ordinary skill in the art. Such an approach is broad in concept and can be either explicit or implicit in meaning.
4. Examiner's Opinion: The applicant's response dated November 19, 2003 is not fully responsive under 37 CFR 1.111(b). The applicant is required to respond to each and every specific point made by "...**specifically pointing out how the language of the claims patentably distinguishes them from the references...**" (37 CFR 1.111(b), emphasis added). Mere general reference to only claims 1 and 9 is indicative of a not fully responsive reply to the Examiner's office action. Notwithstanding this

concern but in accordance with MPEP 714.03(A), the amendment has been accepted to avoid abandonment.

### ***Status of Claims***

5. Claims 1-20 are pending.

### ***Response to Arguments***

6. The objections to claims 7 and 14 remain. Both independent claims 1 and 9 set forth generating **an optimized rule** as part of the evolving step and since **an optimized rule** is indeed one rule, and since the quantity of one was thereby predetermined, claims 7 and 14 do not further limit the respective independent claims.

7. Applicant's arguments filed on November 19, 2003 related to Claims 1-20 have been fully considered but are not persuasive.

In reference to Applicant's argument:

The present invention relates to a fuzzy logic system with evolutionary variable rules. According to the present invention, the features, qualifiers, and operators of rules, and the rules themselves, are continually generated and evolved using genetic algorithms, based on real-time data. This invention is especially useful in stock market forecasting and, in particular, day-trading wherein the pertinent data may change many times over a short period of time.

First, a random set of rules (a population of chromosomes) is generated using a random selection from each of the categories of operators, features, cases, and qualifiers. Next, the population of chromosomes are evolved to improve their fitness function in a known manner. The fitness function is a cost function that penalizes the algorithm if it renders non-compliant results, i.e., results that do not logically follow the trend of the input data.

Once the fitness function plateaus for the population (i.e., ceases to improve) the resultant rule (a chromosome) is stored, e.g., in a bin, thereby creating a storage location or "binning pool" in which "optimized" rules are accumulated. The chromosomes then go through further generation (initialization)

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and evolution to improve their overall fitness function. The chromosomes that are subjected to this further evolution may be a set of newly generated chromosomes (including chromosome(s) from the previous evolutionary session). This process is repeated until adding more chromosomes to the optimized rule pool does not improve the overall fitness of the pool. At this point the algorithm may be stopped and the best chromosomes then define the rules of the system. For example, if it is presumed that a optimized chromosome pool, population can contain 15 chromosomes, then once 16 chromosomes have been established, an evaluation is made and the 15 fittest chromosomes are kept while the worst of the 16 is deleted.

Thus, the fuzzy logic system of the present invention creates fuzzy rules in real-time and updates the fuzzy rules dynamically. This is accomplished by using genetic algorithms to continually optimize the features, qualifiers, cases, and operators of the fuzzy rules until they plateau. The fuzzy logic system may be utilized in applications requiring constantly-updated fuzzy rules and also in applications where fuzzy rules are difficult to pre-define due to a large quantity of input data, such as, for example, stock market forecasting.

Examiner's response:

Statements acknowledged.

In reference to Applicant's argument:

Hung teaches a genetic algorithm for constructing and tuning a fuzzy logic system. More specifically, Hung deals with an optical character recognition (OCR) application, whereby training sets of optimized moment and variant character data are used to evaluate fuzzy logic systems modeled with parameters produced through the use of a genetic algorithm. The fuzzy logic systems are evaluated and given a score to input back into the genetic algorithm, which uses the score in a reproduction process to produce new chromosomes for reinsertion into the fuzzy logic system models. Of relevance to the present invention is the fact that the chromosomes are evaluated to determine their performance within a model of the fuzzy logic system to be developed. The evaluation process includes a comparison to a threshold value which, if met, terminates the process.

Examiner's response:

Statements acknowledged.

In reference to Applicant's argument:

Chidambaran et al. teach the use of genetic programming. to create a computer program that approximates the relationship between the price of a stock option, the terms of the option contract, and the properties of the underlying stock price that forms the basis for the stock option. Using genetic programming, the authors of the Chidambaran et al reference claim that they can create a computer, program that achieves a better solution to p the problem (approximating the relationship between the option price, the option contract and the underlying stock price) than the "Black -Scholes " option pricing model, a widely accepted option pricing theory used in financial markets at the time of the writing of the Chidambaran et al. reference. In accordance with Chidambaran et al., the steps of the

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evolutionary program are repeated for a "pre-specified number of times" and then the steps are terminated.

Examiner's response:

Statements acknowledged.

In reference to Applicant's argument:

The hybridizing of fuzzy logic and genetic algorithms is the topic of textbook explanation and neither Hung nor the present invention can claim such broad concepts as being within the scope of their respective inventions. Hung uses such hybridized elements for the specific problem of optical character recognition (OCR).

The present claims are directed specifically to the derivation and generation of an optimized rule set for a fuzzy logic system. As described in the present application, these have specific application in the field of market prediction. Most importantly, Hung is devoid of any teaching or suggestion of continuing of the evolutionary process until the fitness function of the rules cannot be further improved, i.e., become substantially constant, indicating that it has reached a plateau.

The Examiner asserts that column 4, lines 27-67 through column 5, lines 1-8 teaches the evolving of random rules using a genetic algorithm to improve their fitness function until the overall fitness function of the rules plateaus. However, it is clear from reading these cited sections that, contrary to the assertion of the Examiner, plateauing is not taught or suggested by Hung. Specifically, Hung teaches the setting of a threshold value and determination of the process when the threshold is met. In other words, a target value is preset ahead of time, and when the target value is reached, the process is completed. By contrast, the present invention, as specifically claimed in both independent claims 1 and 9, involves the continuing of the evolutionary process, not for a fixed, predetermined number of generations, nor until a fixed, predetermined value is reached, but instead, it continues until the fitness function of the rules cannot be further improved, i.e., becomes substantially constant, indicating the reaching of the plateau. As an example of the differences, it is conceivable that using the Hung process, the threshold level will be reached after a single evolutionary process step, and that if additional evolutionary process steps were performed, additional improvement would occur. However, since Hung relies upon a threshold level, these additional improvements will never be realized.

By contrast, by focusing on plateauing, as is done in the present invention, the process proceeds until there is no apparent value to continuing. This is significantly different from the Hung reference and results in the potential for much improved results. These elements are specifically claimed in the present invention, and thus all of the claims are allowable over Hung.

Examiner's response:

Para 3 above applies. The Examiner has not invited the applicant to evaluate

Hung's patent. The applicant is invited to show how the applicant's claims

distinguishes the applicant's invention from that of the prior art. To one of ordinary skill

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in the art (note para 3 above), the Examiner can state and is stating that plateaus and thresholds are synonymous. Examiner assumes that applicant in the reply dated November 19, 2003 at p 5, l 22 means "termination" and not "determination". The Examiner invites the applicant to review Hung at c 4, l 36-40. To one of ordinary skill in the art, when one maximizes the function  $f(x) = x^2$ , one continues the genetic algorithm operation until "the fitness function of the rules cannot be improved"...this is a plateau or threshold. Hung's threshold value is set by the maximizing of the function which is the anticipation of the applicants plateau. Further, Hung reaches the plateau/threshold since he is maximizing  $f(x)$ . At maximization, Hung stops because there is no need for further iteration. This concept of maximization is well established in the art...it is generic.

In reference to Applicant's argument:

The addition of Chidambaran does not teach or suggest the plateauing evolution process claimed in each of the independent claims herein. Without such teaching or suggestion, it is improper to reject the claims based upon the proposed Huang/Chidambaran combination proposed by the Examiner.

Examiner's response:

Para 3 applies. Chidambaran teaches applications of genetic programming to the subject of financial markets to include stock markets. From above, Huang does indeed anticipate the applicant's concept of plateauing. It is an obvious and simple combination of the concepts of Huang and Chidambaran that accommodates the combination and thereby anticipates the applicant's invention. See prior office action.

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In reference to Applicant's argument:

Applicant has presented, in this response and in the response filed on July 29, 2002, and in the Appeal Brief filed on June 25, 2003, sufficient reasons why the present invention patentably defines over the Chidambaran and Hung references, either alone or in combination.

Examiner's response:

Applicant should review the Office Action dated August 15, 2003 at para 4. At that time, prosecution was reopened and since the applicant did not request reinstatement of the appeal, any reference to an appeal brief is moot. The appeal brief of reference has been placed in the file but has not been reviewed. No further action concerning the appeal brief is planned.

***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Hung (U.S. Patent 5,727,130, referred to as **Hung**).

**Claim 1**

Hung anticipates generating a pool of random rules having a fitness



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function and storing said random rules (**Hung**, col 123, lines 37-41; col 4, lines 27-40); evolving said random rules using a genetic algorithm to improve the fitness function of said rules in said random rule set until the overall fitness function of said rules plateaus, thereby generating an optimized rule (**Hung**, col 4, lines 27-67; col 5, lines 1-8); and storing said optimized rule in an optimized rule storage area, said rules stored in said optimized rule storage area comprising said optimized rule set (**Hung**, col 7, lines 20-22; col 12, lines 31-35).

**Claim 2**

Hung anticipates checking said optimized rule storage area to determine if it contains any optimized rules (**Hung**, col 12, lines 31-35; col 5, lines 1-4); and using any optimized rules contained in said optimized rule storage area when generating said pool of random rules (**Hung**, col 12, lines 31-35; col 5, lines 1-4).

**Claim 3,**

Hung anticipates evolving step comprises evolving the features of said random rules (**Hung**, col 4, lines 23-25; col 7, lines 29-50; Examiner's Note: Chromosomes are made up of rules which are made up of operators, features, cases and qualifiers).

**Claim 4,**

Hung anticipates evolving step comprises evolving the qualifiers of said random rules (**Hung**, col 4, lines 23-25; col 7, lines 29-50; Examiner's Note: Chromosomes are made up of rules which are made up of operators, features, cases and qualifiers).

**Claim 5,**

Hung anticipates evolving step comprises evolving the operators of said random rules (**Hung**, col 4, lines 23-25; col 7, lines 29-50; Examiner's Note: Chromosomes are made up of rules which are made up of operators, features, cases and qualifiers).

**Claim 6,**

Hung anticipates evolving step comprises evolving the features, cases, qualifiers, and operators of said random rules (**Hung**, col 4, lines 23-25; col 7, lines 29-50; Examiner's Note: Chromosomes are made up of rules which are made up of operators, features, cases and qualifiers).

**Claim 7,**

Hung anticipates generating, evolving, and storing steps are repeated until a predetermined number of rules are stored as said optimized rule set (**Hung**, col 4, lines 66-67; col 5, line 1; EN: in reference to para 6 above, "rules" is interpreted to be singular).

**Claim 8,**

Hung anticipates said repeating of said steps occurs on a real-time basis (**Hung**, col 2, lines 59-67; col 3, lines 21-24; EN: Hung anticipates efficiency or real time operation).

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 9-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hung in view of Chidambaran (U. S. Patent 5, 727,130, referred to as **Hung**; IEEE 98<sup>TH</sup>8367, referred to as **Chidambaran**).

**Claim 9**

Hung teaches generating a pool of random rules having a fitness function and storing said random rules (**Hung**, col 123, lines 37-41; col 4, lines 27-40); evolving said random rules using a genetic algorithm to improve the fitness function of said rules in said random rule set until the overall fitness function of said rules plateaus, thereby generating an optimized rule (**Hung**, col 4, lines 27-67; col 5, lines 1-8); and storing said optimized rule in an optimized rule storage area, said rules stored in said optimized rule storage area comprising said optimized rule set (**Hung**, col 7, lines 20-22; col 12, lines 31-35).

Hung does not teach applying a stock market data set to said optimized rule set. Chidambaran does teach applying a stock market data set to said optimized rule set (**Chidambaran**, page 197, lines 13-15). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use stock market data in an optimized rule set. The use of such data would have been obvious because one of ordinary skill in the art would have been motivated for financial gain to use such data.

Hung does not teach outputting a stock market analysis result based on the application of said stock market data set to said optimized rule set. Chidambaran does teach outputting a stock market analysis result based on the application of said stock

market data set to said optimized rule set (**Chidambaran**, page 197, lines 13-15).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to develop stock market analysis from the analysis of stock market data. The development of such analysis would have been obvious because one of ordinary skill in the art would have been motivated by financial gain and such analysis is axiomatic to the output of completed action.

**Claim 10**

Hung teaches evolving step comprises evolving the features of said random rules (**Hung**, col 4, lines 23-25; col 7, lines 29-50; Examiner's Note: Chromosomes are made up of rules which are made up of operators, features, cases and qualifiers).

**Claim 11**

Hung teaches evolving step comprises evolving the qualifiers of said random rules (**Hung**, col 4, lines 23-25; col 7, lines 29-50; Examiner's Note: Chromosomes are made up of rules which are made up of operators, features, cases and qualifiers).

**Claim 12**

Hung teaches evolving step comprises evolving the operators of said random rules (**Hung**, col 4, lines 23-25; col 7, lines 29-50; Examiner's Note: Chromosomes are made up of rules which are made up of operators, features, cases and qualifiers).

**Claim 13**

Hung teaches evolving step comprises evolving the features, cases, qualifiers, and operators of said random rules (**Hung**, col 4, lines 23-25; col 7, lines 29-50;

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Examiner's Note: Chromosomes are made up of rules which are made up of operators, features, cases and qualifiers).

**Claim 14**

Hung teaches generating , evolving, and storing steps are repeated until a predetermined number are stored as said optimized rule set (**Hung**, col 4, lines 66-67; col 5, line 1; EN: in reference to para 6 above, "rules" is interpreted to be singular).

**Claim 15**

Hung teaches repeating of said steps occurs on a real-time basis (**Hung**, col 2, lines 59-67; col 3, lines 21-24; EN: Hung anticipates efficiency or real time operation).

**Claim 16**

Hung does not teach that stock market data set comprises data regarding a particular stock choice. However, Chidambaran does teach stock market data set comprises data regarding a particular stock choice (**Chidambaran**, page 202, lines 18-20). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a stock selection from a stock database. The use of selective data would have been obvious to one of ordinary skill in the art motivated by financial gain. (EN: Applicant has stated (Reply of August 9, 2002, page 3) that "particular stock choice", "particular stock market", "mutual funds", and "futures" are elementary investment terms that are known to most members of the general public and hence would be known to one of ordinary skill in the art).

**Claim 17**

Hung does not teach stock market data set comprises data regarding a particular stock market. However, Chidambaran does teach stock market data set comprises data regarding a particular stock market (**Chidambaran**, page 202, lines 18-20).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a stock market selection from a stock database. The use of selective data would have been obvious to one of ordinary skill in the art motivated by financial gain within the stock investment market. See comments of Claim 17.

**Claim 18**

Hung does not teach stock market data set comprises data regarding a particular segment of stocks. However, Chidambaran does teach stock market data set comprises data regarding a particular segment of stocks (**Chidambaran**, page 202, lines 18-20). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a stock selection of a segment of the market (i.e. mutual funds) from a stock data base. The use of selective data would have been obvious to one of ordinary skill in the art motivated by financial gain within the stock investment market for diversification. See comments of Claim 17.

**Claim 19**

Hung does not teach stock market data set comprises data regarding mutual funds. However, Chidambaran does teach stock market data set comprises data regarding mutual funds (**Chidambaran**, page 201, lines 4-12). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to

make a stock selection of a segment of the market (i.e. mutual funds) from a stock data base. The use of selective data would have been obvious to one of ordinary skill in the art motivated by financial gain and using the expertise of a market manager. See comments of Claim 17.

#### **Claim 20**

Hung does not teach stock market data set comprises data regarding futures. However, Chidambaran does teach stock market data set comprises data regarding futures (**Chidambaran**, page 201, lines 4-12). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a market anticipation selection of data from a stock database. The use of market anticipation data would have been obvious to one of ordinary skill in the art and very motivated by financial gain. See comments of Claim 17.

#### ***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Claims 1-20 are rejected.

***Correspondence Information***

14. Any inquiry concerning this information or related to the subject disclosure should be directed to the Examiner, Joseph P. Hirl, whose telephone number is (703) 305-1668. The Examiner can be reached on Monday – Thursday from 6:00 a.m. to 4:30 p.m.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Anil Khatri can be reached at (703) 305-0282.

Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks,

Washington, D. C. 20231;

or faxed to:

(703) 746-7239 (for formal communications intended for entry);



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or faxed to:

(703) 746-7290 (for informal or draft communications with notation of  
"Proposed" or "Draft" for the desk of the Examiner).

Hand-delivered responses should be brought to:

Receptionist, Crystal Park II

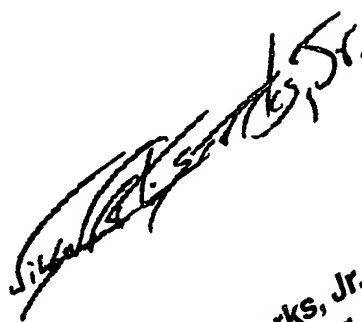
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Joseph P. Hirl



February 5, 2004



Wilbert L. Starks, Jr.  
Primary Examiner  
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